

## **METHOD FOR WEB PAGE RULES COMPLIANCE TESTING**

### **TECHNICAL FIELD**

5           The present invention relates, generally, to the field of software development tools and, more specifically, to methods, systems and apparatuses for testing a hypertext document for compliance with selected rules.

### **BACKGROUND OF THE INVENTION**

10           The World Wide Web is a collection of hypertext documents, or "web pages", which may contain text, pictures and/or sound. A hypertext document is written in a programming language to create an executable program. Since hypertext documents are written with generally compatible programming languages including Hypertext Markup Language, "HTML", Extensible Markup Language, "XML" and XHTML (Extensible Hypertext  
15 Markup Language), these documents can be presented, stored and distributed almost universally across a network of client terminals and servers, such as the public Internet or a private intranet.

          As a web page is being developed, there are certain rules which must be followed. A project manager may include compliance testing as part of the modular programming stage  
20 of a project when each programmer has a section of code to write and debug. Alternatively, a project manager may choose to include compliance testing in the integration stage of a project when code sections are integrated into a complete document. However, it is difficult and time consuming for project managers to track down compliance problems at the integration stage of the development process. The origin of the problem may be embedded  
25 in a section of code or may be a result of the integration of the various sections. Further, after a web page has been developed, even if it is rules compliant at the time of development, the rules may change.

          For example, a company or a department may change its name, or the name of a product. In this case it would be desirable to determine on which web pages the former  
30 name appears, and where on those web pages the former name appears.

          As another example, a hypertext document should be in a format useful for presentation to all users. However, standardized programming syntax is often necessary to

ensure the correct performance of assistive I/O software and devices, such as a web page reader, that are intended to allow certain disabled users access to web page content. Thus, it is often desirable to standardize hypertext documents for compliance with selected criteria or rules, which may be new rules, or which may be modifications to older rules. These rules  
5 may include code validation standards to which a document should adhere for uniform presentation, universal network compatibility, or compliance with government regulations. To that end, there has been a recent effort by governments and non-governmental agencies to establish accessibility rules that provide a standard for developers to follow when creating hypertext documents. For example, Section 508 of the U.S. Rehabilitation Act of  
10 1973 was enacted to improve access to mainstream technology and provide standards for assistive technologies for disabled users.

Once rules, such as a name change or those in Section 508, have been developed and become effective, documents should be checked to ensure that they are rules compliant.

Programs are available wherein the user can specify a web page and the rule or rules  
15 to be tested, and the program will access that web page, analyze that web page for compliance with the specified rules, and provide a report. However, these programs are limited to analysis of a single web page, and only provide a report, not a copy of the web page, so each web page must be separately specified and tested. Also, someone must compile a list of the web pages to be analyzed and input this information, one web page at a  
20 time. This is tedious and time-consuming and very prone to errors. For example, in sites where there are hundreds or even thousands of web pages, some pages will be missed, and other pages will be unnecessarily tested several times. Further, the prior art does not provide information about a collection of tested web pages. For example, the prior art does not enable one to determine what rules are most problematic and where they occur.

25 Web crawler programs are also available. A web crawler program starts with a specified web page, copies and stores it, locates links within that web page to other web pages, accesses, copies and stores each of those web pages, etc. However, although web crawlers may eventually capture and store all of the web pages of an entire site, they do not analyze those web pages.

30

## SUMMARY OF THE INVENTION

Briefly described, the present invention provides for accessing and analyzing a selected hypertext document for compliance with selected rules or criteria. Such rules include programming syntax, accessibility rules for disabled users, and name changes. In addition, the present invention provides for accessing, storing, and analyzing hypertext documents which are linked from the selected document.

The present invention therefore provides for linking one program, which will test a specified web page for compliance with specified rules, with another program, which accesses a web page, stores it, detects links to other web pages, accesses and stores those web pages, detects further links, etc. The present invention further provides for storing the results of these programs and compiling the results of the analysis.

Thus, the present invention provides for automatically accessing and analyzing a series of web pages rather than having to perform such access and analysis one page at a time under manual control. As a result, the user is provided with a comprehensive view of the rules compliance of an entire web site, or to a lesser degree if desired, including information regarding the errors, and where the errors occurred, and links to the web pages where the errors occurred.

The present invention preferably includes an input device, such as a client terminal, for accepting a user's selection of a document, the rules under which the document will be analyzed, and the number of levels which will be linked for analysis.

In an alternative embodiment, the present invention rather than storing just links to the web pages, also stores (archives) a copy of the web page. By storing the actual web page on which the analysis is performed, a snapshot of the web page at that point in time is available. This provides for future uses including presentation of errors and their effects on the web pages, such as for training or further analysis, and for comparison with past or future versions of web pages and/or testing rules, and their results.

The present invention particularly identifies which pages have been tested, which pages have passed or failed a particular test, what the most common failures are, etc. This capability allows developers to isolate problems earlier in the design cycle for greater efficiency in fixing problems and reducing the time penalties involved in isolating a problem.

Other advantages, benefits, and improvements provided by the present invention over the prior art will become apparent upon reading the specification below in conjunction with the appended drawings.

## 5     **BRIEF DESCRIPTION OF DRAWINGS**

Fig. 1 illustrates an example of a suitable computing system environment on which the invention may be implemented;

Fig. 2 illustrates a flowchart representing the basic operation of the rules engine component of the present invention; and

10     Fig. 3 is a block diagram representing various embodiments of the present invention.

## **DETAILED DESCRIPTION OF THE INVENTION**

Refer now to the drawings in which like numerals represent similar elements or steps throughout the several views. Fig. 1 illustrates an example of a suitable computing system environment **100** on which the invention may be implemented. The computing system environment **100** is only one example of a suitable computing environment and is not intended to suggest any limitation as to the scope of use or functionality of the invention. Neither should the computing environment **100** be interpreted as having any dependency or requirement relating to any one component or combination of components illustrated in the exemplary operating environment **100**.

20     The invention is operational with numerous other general purpose or special purpose computing system environments or configurations. Examples of well known computing systems, environments, and/or configurations that may be suitable for use with the invention include, but are not limited to, personal computers, server computers, hand-held or laptop devices, multiprocessor systems, microprocessor-based systems, set top boxes, programmable consumer electronics, network PCs, minicomputers, mainframe computers, distributed computing environments that include any of the above systems or devices, and the like.

30     The invention may be described in the general context of computer-executable instructions, such as program modules, being executed by a computer. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. The invention may also be

practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote computer storage media including memory storage devices.

5           With reference to Fig. 1, an exemplary system for implementing the invention includes a general purpose computing device in the form of a computer **110**. Components of computer **110** may include, but are not limited to, a processing unit **120**, a system memory **130**, and a system bus **121** that couples various system components including the system memory **130** to the processing unit **120**. The system bus **121** may be any of several types of  
10 bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. By way of example, and not limitation, such architectures include Industry Standard Architecture (ISA) bus, Micro Channel Architecture (MCA) bus, Enhanced ISA (EISA) bus, Video Electronics Standards Association (VESA) local bus, and Peripheral Component Interconnect (PCI) bus also known as Mezzanine bus.

15           Computer **110** typically includes a variety of computer readable media. Computer readable media can be any available media that can be accessed by computer **110**. By way of example, and not limitation, computer readable media may comprise computer storage media and communication media. Computer storage media includes volatile and nonvolatile, removable and non-removable media implemented in any method or  
20 technology for storage of information such as computer readable instructions, data structures, program modules or other data. Computer storage media thus includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which  
25 can be used to store the desired information and which can accessed by computer **110**. Communication media includes any device or method for transferring data of any kind from one point to another. By way of example, and not limitation, communication media includes wired and wireless media, such as a wired network, direct-wired connection, and acoustic media, RF media, and infrared media.

30           The system memory **130** includes computer storage media such as read only memory (ROM) **131** and random access memory (RAM) **132**. A basic input/output system **133** (BIOS), containing the basic routines that help to transfer information between

elements within computer **110**, such as during start-up, is typically stored in ROM **131**. RAM **132** typically contains data and/or program modules that are immediately accessible to and/or presently being operated on by processing unit **120**. By way of example, and not limitation, Fig. 1 illustrates operating system **134**, application programs **135**, other program modules **136**, and program data **137**.

The computer **110** may also include other computer storage media such as, by way of example only, a hard disk drive **141**, a magnetic disk drive **151** that reads from or writes to a magnetic disk **152**, and an optical disk drive **155** that reads from or writes to an optical disk **156**, magnetic tape cassettes, flash memory cards, digital versatile disks, digital video tape, solid state RAM, solid state ROM, and the like. The hard disk drive **141** is typically connected to the system bus **121** through a non-removable memory interface such as interface **140**, and magnetic disk drive **151** and optical disk drive **155** are typically connected to the system bus **121** by a removable memory interface, such as interface **150**.

The computer storage media provide storage of computer readable instructions, data structures, program modules and other data for the computer **110**. For example, hard disk drive **141** stores operating system **144**, application programs **145**, other program modules **146**, and program data **147**. Note that these components can either be the same as or different from operating system **134**, application programs **135**, other program modules **136**, and program data **137**. Operating system **144**, application programs **145**, other program modules **146**, and program data **147** are given different numbers for clarity of illustration.

A user may enter commands and information into the computer **110** through input devices such as a keyboard **162** and pointing device **161**, commonly referred to as a mouse, trackball or touch pad. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit **120** through a user input interface **160** that is coupled to the system bus **121**, but may be connected by other interface and bus structures, such as a parallel port, game port or a universal serial bus (USB).

A monitor **191** or other type of display device is also connected to the system bus **121** via an interface, such as a video interface **190**. In addition to the monitor, computers may also include other peripheral output devices such as speakers **197** and printer **196**, which may be connected through an output peripheral interface **195**.

The computer 110 preferably operates in a networked environment connected 171, 173 to one or more remote computers, such as a remote computer 180. The remote computer 180 may be a personal computer, a server, a router, a network PC, a peer device or other common network node, and typically includes many or all of the elements described above relative to the computer 110, although only a memory storage device 181 has been illustrated for the remote computer 180. In a networked environment, program modules depicted relative to the computer 110, or portions thereof, may be stored in the remote memory storage device. By way of example, and not limitation, Fig. 1 illustrates remote application programs 185 as residing on memory device 181.

The connections include a local area network (LAN) 171 and a wide area network (WAN) 173, but may also include other networks. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets and the Internet. When used in a LAN networking environment, the computer 110 is connected to the LAN 171 through a network interface or adapter 170. When used in a WAN networking environment, the computer 110 typically includes a modem 172 or other means for establishing communications over the WAN 173, such as the Internet. The modem 172, which may be internal or external, may be connected to the system bus 121 via the user input interface 160, or other appropriate mechanism. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

Turn now to Fig. 2 which illustrates a flowchart representing the basic operation 200 for testing a web page for compliance with selected rules. For the purposes of this disclosure, a hypertext document includes, but is not limited to, text, sound and figures, and is written in one of various hypertext programming languages including HTML, XML, XHTML and other such programming languages that will be familiar to those skilled in the art or may be developed in the future. A hypertext document for the purposes of this disclosure may be, but is not limited to, all or a portion of a World Wide Web page ("web page") or a plurality of web pages which may be linked or non-contiguous. The selected rules are associated with a predetermined standard for web page content. They may be chosen to standardize web page content for the operation of certain universal devices such as web page reader device or other assistive technologies. The rules may also be associated with finding outdated or offensive material, copyright violations or the like. For example,

the operation of a web page reader device may require the selected rules to be associated with accessibility standards for certain disabled users. In another example, a program or device may be configured to find outdated designations for a company that may have changed its name.

5 In operation, the user selects a starting web page, the link level, and the rules to be implemented. In one implementation of the invention cited for example and not limitation, a user may insert information for performing a compliance test on a web page at a prompt from a program. For example, it is well known to add "plug-ins" which provide additional features to existing programs. Thus, for example, if the user interface program is  
10 MICROSOFT® INTERNET EXPLORER™ the plug-in may add the feature of "Compliance Testing" to the "Tools" menu. The user may then select "Compliance Testing" from the "Tools" menu, and an input prompt for a field or fields will be provided 201 to the user. The prompt may allow the user to input information such as a web page identifier for the starting web page, a number of layers of linked web pages to analyze, acceptable  
15 servers, and/or the rules to be implemented. The number of layers may be fixed or may be user selectable and, if user selectable, may or may not have a predetermined limit. This allows an analysis to be controlled so as to cover all of the web pages of a small site or a limited number of web pages at a large site. Limiting the number of link levels serves to prevent system disruptions due to an inordinate number of pages being accessed and/or  
20 analyzed. Alternatively, there may be a termination feature for terminating the analysis after a predetermined number of pages have been analyzed, regardless of whether or not the specified link level has been reached.

A prompt may also allow the user to insert non-contiguous web page identifiers to check non-contiguous web pages, including previously tested pages that a user may choose  
25 to retest. If necessary, the web page identifiers may be separated by any appropriate delimiter. The selected rules to be implemented may be previously established rules, such as from a database, may be inputted or modified manually by a user, or any combination thereof.

A prompt may also allow a user to specify whether or not to archive a copy of the  
30 web page.

Then, in step 202 this information and selection are received from the user. Typically, the user will be at a client terminal and the client terminal will send the user



selections and information to a server for implementation. However, it is also contemplated that the client terminal will directly implement the present invention. It is also contemplated that the client terminal will implement some functions of the present invention and one or more servers will implement other functions of the present invention.

5           In step **203** the starting web page and the link level are sent to a web crawler engine which obtains the starting web page, stores it, determines any links to other web pages, and, if a link is within the specified link level and is to an acceptable server, then the linked web page is obtained. This is repeated until the link level is reached. A record is kept of each web page accessed so that, in the event web pages call each other, a previously accessed  
10 web page is not accessed and stored again.

          In step **204** the retrieved web pages, and the selection of the rules to be implemented, are sent to the rules engine.

          In step **206**, the rules engine analyzes the selected web page or pages based on the selected rules criteria. The analysis comprises receiving at least one parameter indicative of  
15 the selected rules so it can be applied to analyze the web page. For example, if the selected rules involve spell checking, the parameter may represent the correct spelling of a word. As another example, if the selected rule involves a name change, the parameter may represent the old name. As another example, the parameter may be that each figure on a web page includes associated text.

20           As a result of the analysis, the rules engine generates and stores **208** raw analysis data indicative of whether the selected web page or pages are in compliance with the selected rules, a summary of analysis parameters including the date of the test and a description of the selected rules. One such rules engine is a component of the MICROSOFT® Office FrontPage® 2003 software application. The inventors chose this  
25 program for convenience and familiarity, but any program which performs this rules engine function is acceptable.

          In step **210** the raw analysis data is compiled and the compiled data is presented to the user. The compiled analysis data may be displayed in a user selectable format such as a matrix or in a hypertext format. In addition to or in lieu of the raw analysis data, the  
30 compiled analysis data may include detailed information on the content errors discovered during the analysis, the pages or range of pages with errors, the types of errors found, the line number on which the error occurs, the first occurrence of the error on a page, the

number of web pages at each link level, recommended fixes, the number of times a particular error appears, the number of errors in each page, links to the erroneous or offensive source code, summary information, recommended fixes or versions of the selected rules, and/or other data.

5           In step 212 the analysis data may also be presented to applications that track errors in relation to previous tests. For example, such applications would need to track pages that have been tested, specific errors, error resolutions and the like.

10           In step 212 the analysis data may also be presented to other applications programs to fix certain errors. Of course, for an error correction application program to fix an error, the error correction program must have access to the code on the web page server for the particular web page and the authority to modify that code. In addition, the error and the solution should be particularly definable so that the desired result is achieved. If this cannot be done, then the error correction program may be able to suggest a correction to an authorized user or programmer for review and approval, disapproval, or input of a different  
15           correction method. One such application that performs various error correction functions is the MICROSOFT® PREFix software application. Another software application that performs various error correction functions is the MICROSOFT® PREFast software application. The inventors chose these programs for convenience and familiarity, but any program which may perform error correction functions is acceptable.

20           Although the above has been described as a program which calls other programs to perform certain functions, it will be appreciated that some or all of the functions could be performed by a single program.

25           Although the above has been described as a series of steps in one or more computer programs, it will be appreciated that these steps may be executed by one or several instructions to a component or components that may comprise hardware, software, firmware or any combination thereof. These functions may be implemented alone or in conjunction with other programs such as, for example, a programming language compiler.

30           Fig. 3 is a block diagram representing various embodiments of the present invention, showing front end (client side) components 10A, 20 and 30A, and back end (server side) components 10B, 30B and 40. Components 10A, 20 and 30A are application programs, the client terminal, and an associated memory, respectively. Components 10B, 40 and 30B are

application programs, the server, and an associated memory, respectively. The application programs are those that implement the steps of Fig. 2.

In one embodiment it is assumed that components **10A**, **20**, **30A** and **40** are present. In this embodiment the client terminal **20** implements the application programs **10A**. The client terminal **20** accesses the server **40**, obtains the specified web pages from the server **40**, analyzes the specified web pages in accordance with the specified rules, and sends the links to these web pages and/or archives a copy of these web pages, and the analysis data, to memory **30A** for storage.

In another embodiment it is assumed that components **20**, **30A**, **10B** and **40** are present. In this embodiment the client terminal **20** provides the user selections to the server **40**. The server **40** implements the application programs **10B**, retrieves the specified web pages, analyzes the specified web pages in accordance with the specified rules, and stores the links to these web pages and/or archives a copy of these web pages, and the analysis data, in the memory **30A**. This embodiment has the advantage of utilizing the processing capabilities of a centralized server rather than potentially limited client terminal resources.

In still another embodiment it is assumed that components **20**, **10B**, **30B** and **40** are present. In this embodiment the client terminal **20** provides the user selections to the server **40**. The server **40** implements the application programs **10B**, retrieves the specified web pages, analyzes the specified web pages in accordance with the specified rules, and stores the links to these web pages, and the analysis data, in the memory **30B**. The server **40** also preferably archives a copy of the actual web pages, even though they may already exist in memory in server **40**, so as to provide a snapshot copy of the web page as it existed at the time the analysis was performed. This embodiment also has the advantage of utilizing the storage and processing capabilities of a centralized server rather than potentially limited client terminal resources.

In still another embodiment it is assumed that components **10A**, **20**, **30A**, **10B**, **30B** and **40** are present. In this embodiment the client terminal **20** may implement one or more of the programs **10A** and the server may implement other programs **10B**, some of the analysis data may be stored in memory **30A**, and other data may be stored in memory **30B**. For example, the server **40** could implement the web crawler program in **10B**, and store the web pages in memory **30B**, and the client terminal **20** could then retrieve these stored web pages from memory **30B**, implement the rules analysis program in **10A**, and then store the

analysis in memory 30A. This embodiment also has the advantage of utilizing the storage and processing capabilities of a centralized server rather than relying completely on potentially limited client terminal resources.

5 Other variations of assigning programs and storing links to the web pages, the actual web pages and results are possible.

10 Preferably, the web pages which are to be analyzed are stored on the server 40 or a memory associated therewith. However, this is not a requirement and the web pages which are to be analyzed may be stored on another server, which may or may not be associated with the server 40. That is, the desired web pages which are analyzed may be stored  
15 anywhere that is accessible to the client and server side engines (i.e., anywhere in the web cloud 50). For example, if a company has a web site, but does not care to have its own personnel perform the rules implementation analysis, that company may contract with a consultant to do so. The consultant, if not operating from the company's facility, may use his/her own client terminal 20 and server 40, in which case the server 40 will contact the  
15 server of the company to obtain the desired web pages.

20 The present invention thus provides for testing of a web page to determine whether the selected web page meets certain rules. For example, in accordance with Section 508, a web page which has a picture should also have text in association with that picture and preferably providing a least a short description of the figure. This text, which may be hidden  
20 text, can be read by a machine and spoken out loud so that a visually-impaired person will be able to obtain at least some of the benefit from the picture. The present invention therefore provides for testing a web page to determine if there is a reference to a figure. This is easily determined by looking for an "IMG" tag or links or references to specific file types, such as .jpg, .tiff, etc. If there is a tag, link or reference to a figure then the web page is  
25 marked.

It is then determined whether there is a link from the figure, or associated with the figure, to a text document. This may also be determined by looking for links or references to alternate text ("ALT") to the IMG tag, or for specific file types, such as .txt, .doc, etc. If the IMG tag is found, but there is no ALT parameter, then there is an error. If the IMG tag is  
30 found, and there is an ALT parameter, then the ALT parameter is inspected for data that is suspicious. For example, the ALT text is typically specified to be five words or less. If the ALT text is found to be more than five words, then a flag may be generated as the ALT text

may not be in compliance. Also, ALT="", which is null, is sometimes used as a placeholder, which is valid, but it may be an error if it is associated with an IMG tag, as it does not describe the image. Thus, if a link is not found, then it is presumed that the web page is not in compliance. However, if a link is found then further testing may be required to verify that the web page is in compliance. In an alternative embodiment, the web page may be marked, regardless of whether or not it is in compliance, so that the rules may be tested for accuracy.

In addition, some persons are color-blind, so certain shades of text on certain backgrounds would be unreadable to those persons. The present invention allows rules relating to background colors and text colors to be defined and implemented so as to detect occurrences of this problem which would not even be noticed by a color-perceptive programmer.

When a web page is being tested, if there is a link to another web page, that link is stored, that linked web page may be retrieved, and that linked web page may also be tested for compliance. However, there is preferably a limit on the testing of linked web pages; it is generally desirable only to test related web pages, e.g., those with the same primary address, and not those with an external address. For example, if the selected web page is at [www.abc5xyz6.com/user1](http://www.abc5xyz6.com/user1) and has links to web pages at [www.abc5xyz6.com/user2](http://www.abc5xyz6.com/user2) and [www.def7tuv8.com/user3](http://www.def7tuv8.com/user3) then it may be acceptable to test the web page at [www.abc5xyz6.com/user2](http://www.abc5xyz6.com/user2), but it would probably not be desired to test the web page at [www.def7tuv8.com/user3](http://www.def7tuv8.com/user3).

Also, it is also generally desirable only to test to a certain level of linkage. For example, assume that the selected web page is at [www.abc5xyz6.com/user1](http://www.abc5xyz6.com/user1). Assume further that the selected web page has a link to a second web page at [www.abc5xyz6.com/user2](http://www.abc5xyz6.com/user2). Assume further that the second web page has a link to a third web page at [www.abc5xyz6.com/user3](http://www.abc5xyz6.com/user3). Assume that the third web page has a link to a fourth web page at [www.abc5xyz6.com/user4](http://www.abc5xyz6.com/user4), and so on. It may be desirable to limit the number of links to, for example, two levels away from the selected page so that the web pages at [www.abc5xyz6.com/user2](http://www.abc5xyz6.com/user2)-[www.abc5xyz6.com/user3](http://www.abc5xyz6.com/user3) are examined, but web pages [www.abc5xyz6.com/user4](http://www.abc5xyz6.com/user4) and further are not examined. These limitations are for convenience of use and conservation of processor time and memory space and are not limitations on the capabilities of the present invention.

Further, in some situations, it may be desirable that there be no links at all to certain web pages or to unrelated web pages or servers. Thus, each link on a web page may be examined to verify that there are no undesired or malicious links inserted by a hacker or a disgruntled employee or former employee. Examples of such undesired or malicious links are a link to an external or pornographic web site, and a link to sensitive or proprietary company records, such as personnel data, research data, or financial data.

As each page is tested, and the links are detected, the links are also recorded. That way, if web pages have links to each other, then a loop will not be established, nor will processor time nor memory space be wasted retesting the same, previously-tested web page.

Also, the analysis for a web page need not be for a single test as the present invention contemplates that multiple tests may be performed on a web page. For example, an analysis could have a test for spelling, a test for grammar, and a test for Section 508 compatibility.

In addition, the analysis may be performed on-line or off-line. That is, a web page may be downloaded and analyzed in real time (on-line), or a web page may be downloaded, stored, and analyzed at a later time (off-line), such as when the available processor power is not being fully used and is available for other, generally lower-priority, applications. This may be a user-selectable option or it may be predetermined by the computer resources manager.

Further, the present invention is useful with any situation for which a rule can be defined. For example, the present invention is useful for determining if a web page contains a spelling error, an error in grammar or a link to an improper web site or page.

Finally, once the analysis is performed, the user can view the results immediately or the stored results may be called up at a later time for review.

The stored analysis allows the test to be run again at a later time to determine whether the errors, if any, have been fixed or whether, as a result of modifications, new errors have been created which were not previously there.

Thus, the present invention allows the user to select a starting web page for rules-compliance analysis, how many link-levels deep should be tested, the number and type of tests that will be performed, the types of links that are acceptable, whether the tests will be performed on-line or off-line, and when the results will be reviewed. These benefits are independent of each other and may be implemented, or not, as desired.

The present invention has been described in relation to particular embodiments, which are intended in all respects to be illustrative rather than restrictive. Alternate embodiments will become apparent to those skilled in the art to which the present invention pertains without departing from its spirit and scope. Accordingly, the scope of the present invention is to be limited only by the claims below.

5